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Sound Diversity in the Landscape: the Effects of Land Use

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Sound diversity in the landscape: the effects of land use

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Abstract

Climate change, land use change and the introduction of exotic species are the three most important anthropogenic threats to the ecosystems and their biodiversity. In order to evaluate the impacts these threats are having, ecologists need better methods to measure, in space and time, the biodiversity in a fast and scalable way. Our group is proposing the use of the sounds produced by animals in a landscape, the *biophony*, as a proxy for the biodiversity. As a first step in the quantification of biophony, we collected sound recordings from seven sites in the Tippecanoe County, Indiana. These sites were located across a gradient of land use categories, from forests and wetlands to agricultural fields. At each site we recorded the sounds during 15 minutes of every hour, from the beginning of Spring until the end of Fall. These recordings were analyzed by extracting the proportion of the time and frequency ranges that the sounds occupied as a biophony score. We found that the biophony was higher in the forests and wetlands than in the agricultural fields. In addition, we found that the biophony follows the same pattern as the biodiversity in the area, with peaks at dawn, from the bird activity, and after sunset, from the frogs and insects. These sound recordings of this pilot project will allow us to further refine the analysis tools as well as improve our understanding of the sound diversity and its usefulness as a proxy in the measurement of the biodiversity at the landscape scale.

Acknowledgements and software used.

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seewave

ubuntu

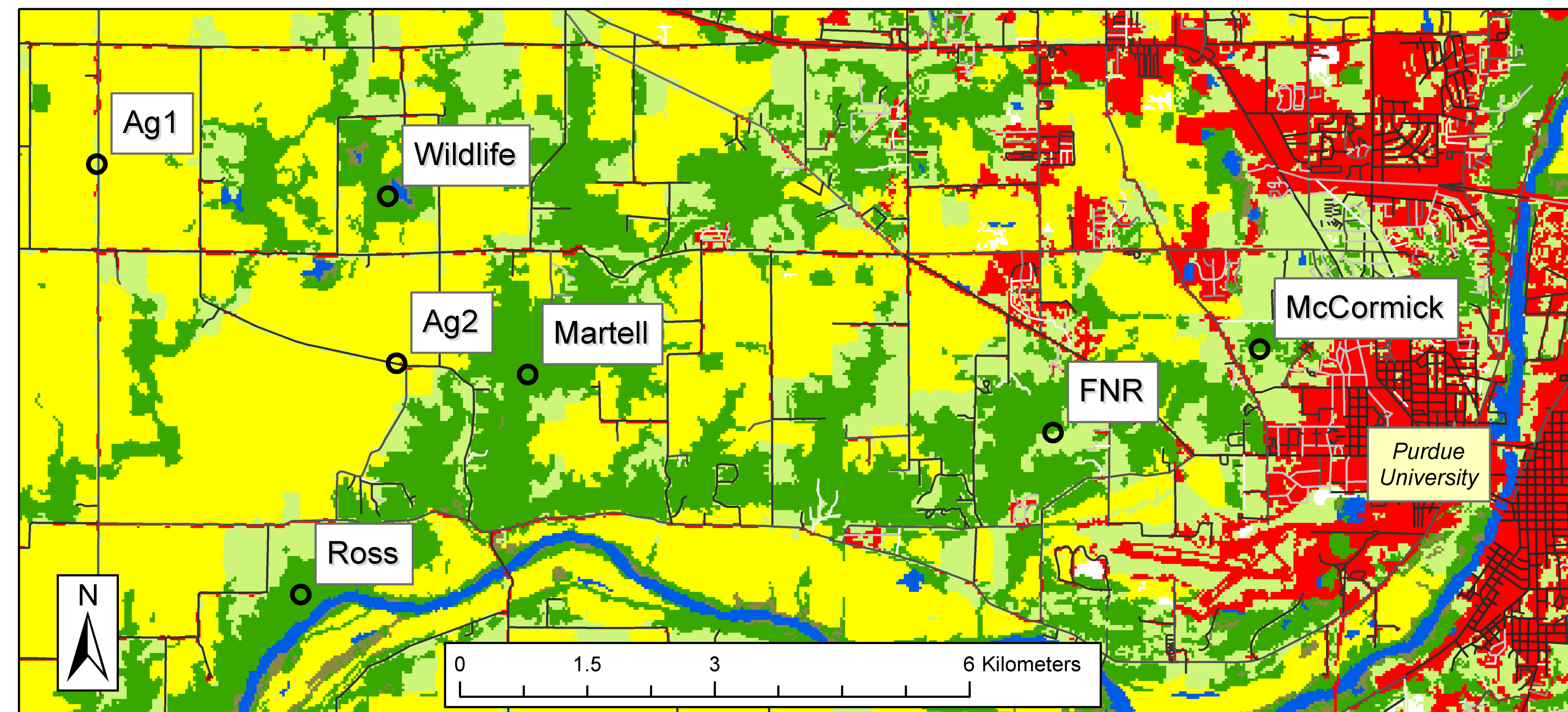


MySQL

APACHE
HTTP SERVER



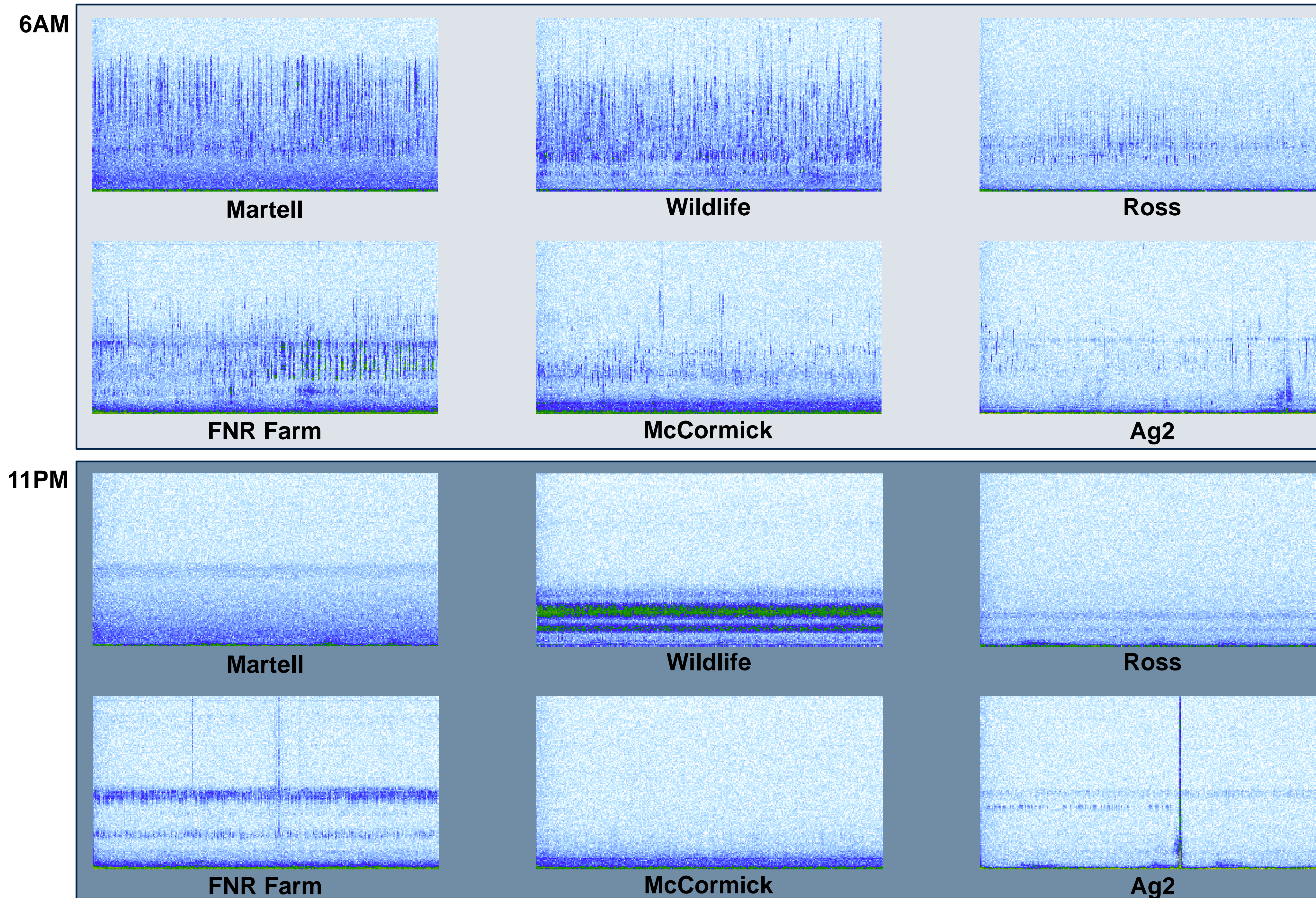
Location of the study sites in the Tippecanoe County.



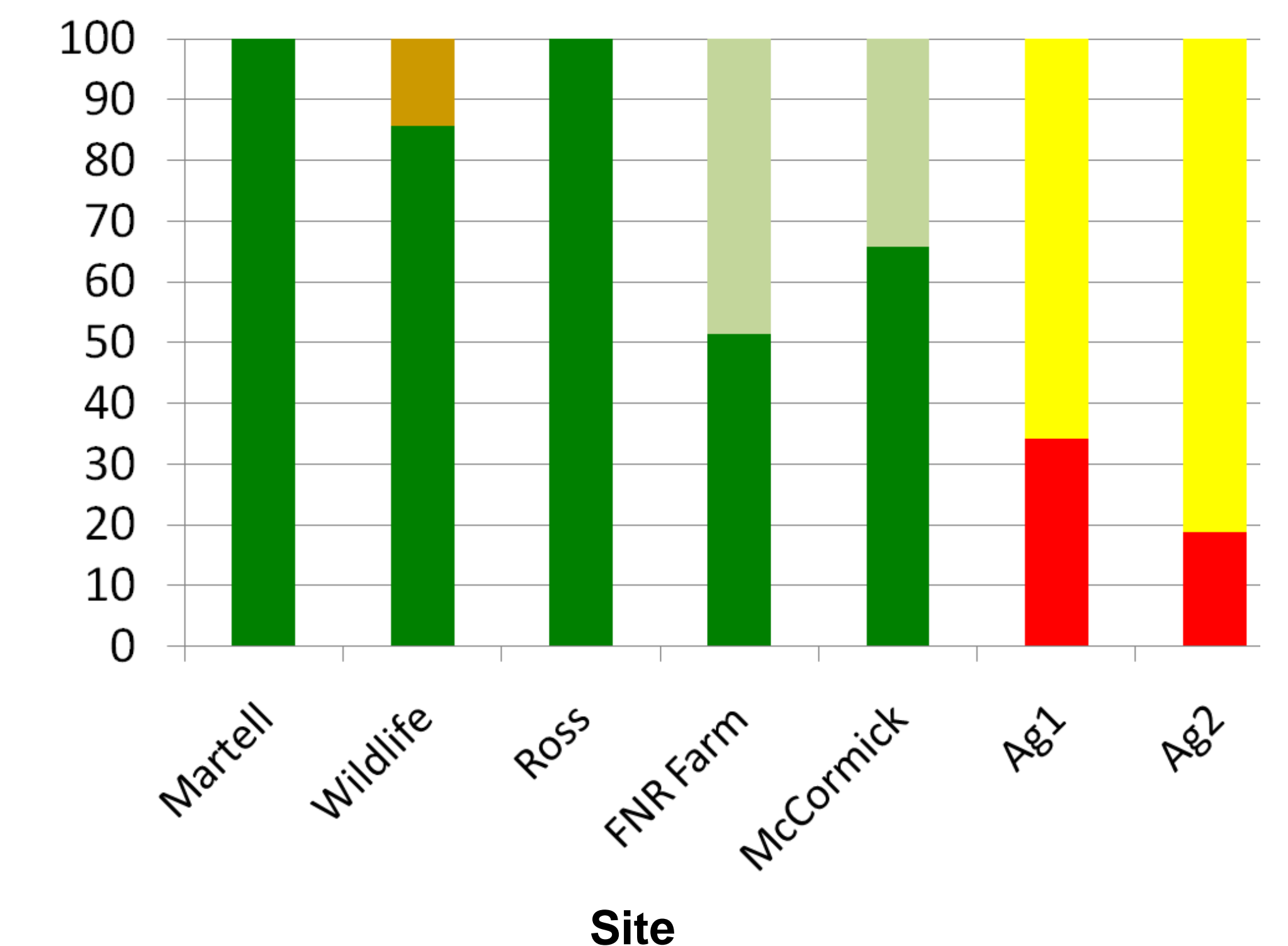
Legend

Water Grassland Urban Forest Agriculture Wetland

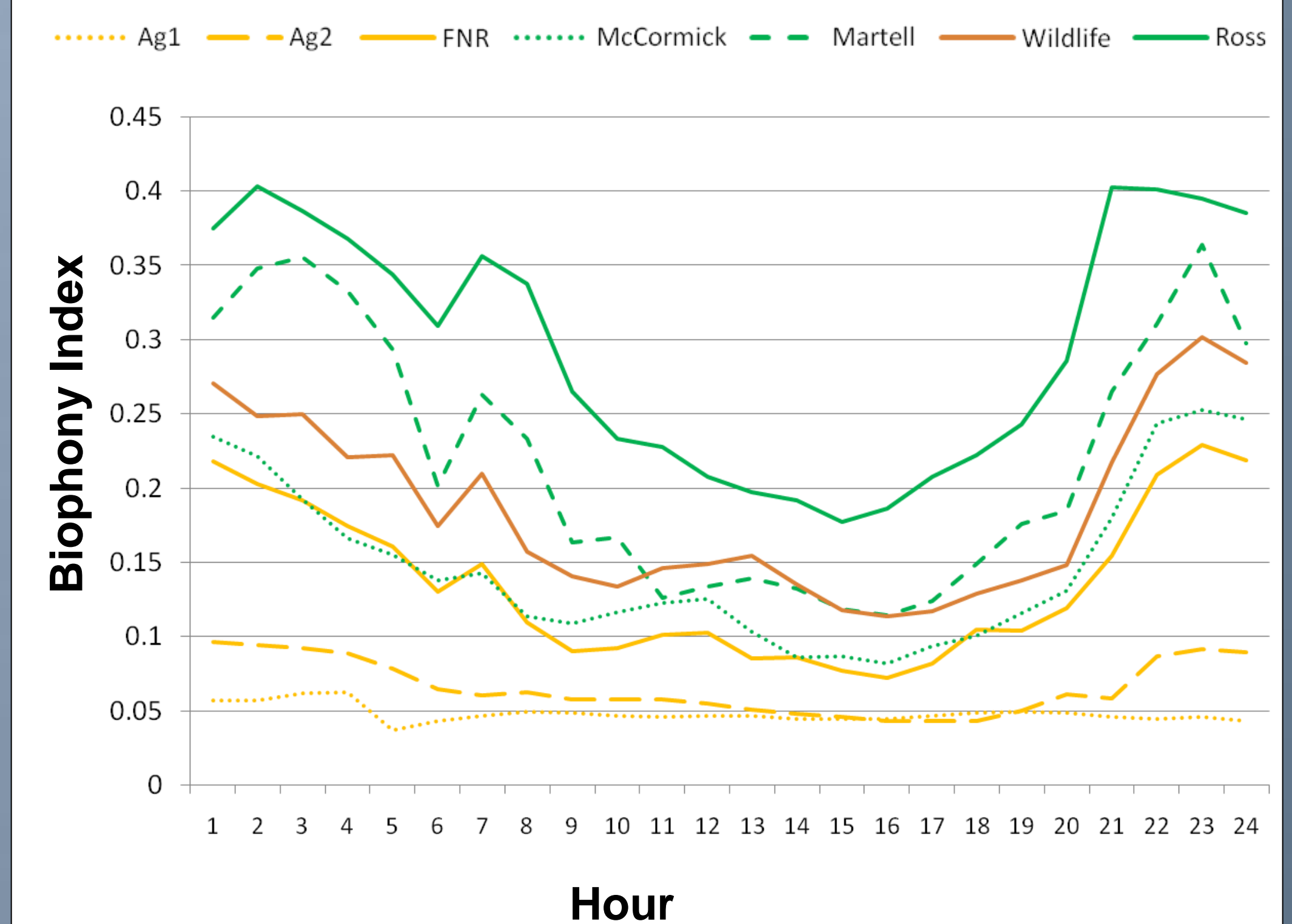
Sample spectrograms of the sounds at the sites. Each image is for a 15 minute sound file and covers up to 11 kHz from 24 May 2010.



Land cover distribution in a 100m radius.



Average score per hour at each site.



Average score per month at each site.

